Issued September 8, 1915.

U. S. DEPARTMENT OF AGRICULTURE.

BUREAU OF SOILS—MILTON WHITNEY, Chief.

IN COOPERATION WITH THE OHIO AGRICULTURAL EXPERIMENT STATION, CHARLES E. THORNE, DIRECTOR; GEORGE N. COFFEY, IN CHARGE SOIL SURVEY.

SOIL SURVEY OF PAULDING COUNTY, OHIO.

BY

H. G. LEWIS, OF THE U. S. DEPARTMENT OF AGRICULTURE, AND CARL W. SHIFFLER, OF THE OHIO AGRICULTURAL EXPERIMENT STATION.

W. E McLENDON, INSPECTOR, NORTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1914.]

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1915.

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LETTER OF TRANSMITTAL.

U. S. Department of Agriculture,
Bureau of Soils,
Washington, D. C., April 28, 1915.

Sir: In the extension of the soil survey in the State of Ohio work was undertaken in Paulding County during the field season of 1914. This work was done in cooperation with the Ohio Agricultural Experiment Station, and the selection of the area was made after conference with State officials.

I have the honor to transmit herewith the manuscript report and map covering this area, and to recommend their publication as advance sheets of Field Operations of the Bureau of Soils for 1914, as provided by law.

Respectfully,

Milton Whitney,
Chief of Bureau.

Hon. D. F. Houston,
Secretary of Agriculture.

CONTENTS.

ILLUSTRATIONS.

FIGURE.

MAP.

SOIL SURVEY OF PAULDING COUNTY, OHIO.

By H. G. LEWIS, of the U. S. Department of Agriculture, and CARL W. SHIFFLER, of the Ohio Agricultural Experiment Station.

DESCRIPTION OF THE AREA.

Paulding County, Ohio, is located in the northwestern part of the State, bordering the State of Indiana. It is bounded on the north by Defiance County, on the east by Defiance and Putnam Counties, and on the south by Putnam and Van Wert Counties. It is approximately rectangular in shape. Its greatest length is 24 miles from east to west, and its greatest width 18 miles from north to south. The county comprises 11½ townships, each of which contains 36 square miles, except two in the northeastern corner. It has an area of 413 square miles, or 264,320 acres.

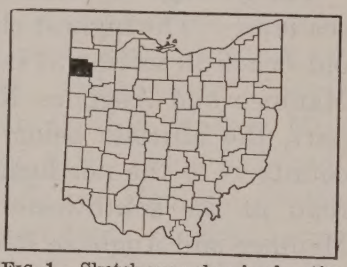

FIG. 1.—Sketch map showing location of the Paulding County area, Ohio.

The surface features of the county are predominantly flat and are characteristic of an old lake plain. The outer beach line of old Lake Maumee passes through sec. 31, in Benton Township, in a northwest-southeast direction. It is not more than one-fourth mile wide in this county and not more than a mile long, but extends into Van Wert and Allen Counties. This ridge or beach extends to Fort Wayne to the west and passes north of Van Wert, through Delphos, east and northeast across the State. It is a low, rounded ridge about 6 to 10 feet higher than the surrounding country and is very little dissected by erosion.

Practically all of the county lies within the Glacial Lake Maumee Basin. The surface features are those of an old lake bottom, more or less influenced by erosion through stream development. It is flat to gently undulating. The most pronounced irregularities are the slight ridges and hillocks of sandy material which are scattered over the county. The greatest development of these sandy ridges is in the northeastern corner of the county, in Brown, Emerald, and Auglaize Townships, and their occurrence indicates that they are a part of a beach formed either along the margin of the retreating lake

or are isolated knolls and ridges that appeared for a time as islands in the lake. These knolls or ridges are 3 to 5 feet above the level of the surrounding country. A few streams have developed, but they have not affected the topography to any appreciable extent back from their courses. In some places the streams are bordered by irregular strips of land somewhat lower than the lake-plain level, while in others the plain continues to the immediate bluffs of the stream courses. There are many large tracts between the rivers that have no well-developed natural drainage ways, being practically level for miles, the elevation of many section corners differing not more than 1 or 2 feet. The strips bordering the stream courses are somewhat more broken and dissected. The larger streams, the Maumee and the Auglaize Rivers, lie 20 to 30 feet below the level of the surrounding country. All of the stream courses are bordered by bottom lands subject to overflow, which vary in width. Along the smaller streams the bottoms are generally narrow, and along the Maumee River they vary from quite narrow to about one-half mile in width. The bottoms along the Auglaize are narrower, and in places there is no bottom land.

The average elevation of Paulding County is about 745 feet above sea level. The highest elevation, about 775 feet, is reached along the old beach in section 31 in Benton Township. The lowest is where the Maumee and Auglaize Rivers leave the county in the northeastern part, the altitude being about 680 feet. The general slope of the county is to the northeast. There is a fall of 56 feet from the ridge road in the southwestern corner to the county line between the Maumee and Auglaize Rivers in the northeastern section, the distance being about 26 miles. This is an average fall of a little more than 2 feet to the mile, which is hardly perceptible.

Paulding County is situated in the basins of the Maumee and Auglaize Rivers. The Auglaize River with its tributaries drains the eastern and southern three-fourths of the county. The Maumee River, which crosses the northwestern corner of the county, drains the remainder. The Maumee and Auglaize Rivers have very little fall within the county. The streams are large, but are not used for power development.

Originally this territory was held by the Indians. The village of Charloe, on the Auglaize River, was near the center of a reserve held by them until 1820. In 1818, by treaty, the Indians ceded the land to the United States.

The first settlements in the county were made along the rivers. The first white settlement was made in section 19, in Auglaize Township, in 1819. In 1828 settlements were made along the Little Auglaize River, and in 1834 along Blue Creek. The first settlers came from other sections of Ohio, New York, and other eastern States. The

settlement of the county was slow until the last quarter of the nineteenth century. Of late years settlers have come into the county from Indiana and Illinois.

Paulding County, named in honor of John Paulding, was organized in 1820. The land was surveyed in 1819. Originally Paulding County contained all of townships 1, 2, and 3 N., ranges 1, 2, 3, and 4 E., but in 1845 the north half of township 3 N., range 4 E., was added to Defiance County. New Rochester, located just north of Cecil, on the Maumee River, was made the first county seat in 1839. This was a flourishing village at that time. In 1841 the county seat was changed to Charloe, where it remained until 1851, when Paulding was selected.

Paulding is situated near the center of the county, on the Cincinnati Northern Railroad. It has a population of about 2,100 and is the largest town in the county. It has paved streets, electric lights, waterworks, and a graded and high school. A large and well equipped beet-sugar factory is one of the important industrial plants at this place. The town is located in the center of a rich and extensive farming section. Payne, on the New York, Chicago & St. Louis Railroad, is an important town with a population of about 1,300. Antwerp, with a population of about 1,200, is situated in Carryall Township, on the Wabash Railroad. Cecil, in Crane Township, on the same line, has a population of about 300. Other towns of local importance are Worstville, Briceton, Latty, Broughton, Hedges, Melrose, and Oakwood, on the New York, Chicago & St. Louis Railroad; McGill, Batson, Tipton, Haviland, Grover Hill, and Mandale, on the Cincinnati, Hamilton & Dayton Railroad; and Scott, on the Cincinnati Northern. Junction and Charloe are small settlements on the old Miami and Erie Canal and the Auglaize River. According to the 1910 census, Paulding County has a population of 22,730.

Paulding County is well supplied with roads, which are in good condition. The roads follow land lines, except along the streams. Many of them are macadamized, there being a total of about 700 miles either built or in the course of construction at the time of the survey. The crushed stone used in road building is largely imported, though there are a few small quarries along the Auglaize River and northeast of Grover Hill. The macadamizing of the roads is necessary because in seasons of heavy rainfall roads on the Clyde clay and other heavy soils are almost impassable where not graded and piked.

The transportation facilities are good. With the exception of the extreme northeastern township, Auglaize, every township is traversed by at least one railroad line, and shipping points are easily reached. The Wabash, the New York, Chicago & St. Louis (Nickel Plate), and the Cincinnati, Hamilton & Dayton Railroads traverse

the county from east to west. The Cincinnati Northern Railroad passes through the county from north to south, connecting with the main east-and-west lines.

The county is well supplied with churches and schools in modern and substantial buildings. Grain elevators in the towns are easily reached from all parts of the county. A good system of local and long-distance telephone lines has been established in the county, and mail delivery routes reach almost every rural section.

This is an agricultural county, the larger part of the population being engaged in farming. It is located in one of the best agricultural sections of the State. While nearly all of the land is cleared, there are some small patches of oak, elm, and other trees, used for wood, posts, and for shade in pasture lands.

CLIMATE.

The climate of Paulding County is healthful and well suited to general farming. The winters are rather long and cold, and as a rule there is considerable snow, which usually lasts for many days at a time. The mean temperature for the winter months, December, January, and February, is 25.9° F. The mean temperature for the spring months is 49.1° F., and for the summer months 70.8° F. For the fall months, September, October, and November, it is 52.5° F. The maximum temperature recorded is 105° F., occurring in the month of July, while the lowest is −21° F., recorded in January. The mean annual temperature is reported as 49.6° F. Long periods of hot weather seldom occur, though occasionally for two to four days the temperature ranges from 95° to 100° F. Zero weather seldom lasts for more than three to five days. It is usually accompanied by snow.

The mean annual precipitation is reported as 32.76 inches. During the winter months the precipitation averages about 7.22 inches, and is largely in the form of snow. During the spring months there is an average of 9.16 inches, while for the summer months the mean is 9.41 inches. The lightest seasonal rainfall is during the fall months, when it averages 6.97 inches. In general, the rainfall is quite evenly distributed throughout the growing season, the larger part of it occurring in the spring and summer months. Crops seldom suffer from extreme drought or from excessive rainfall. The total amount of rainfall for the driest year recorded is 26.23 inches, and for the wettest 42.76 inches.

The average date of the last killing frost in the spring is May 13, and of the first in the fall September 30. This gives a normal growing season of 141 days, or about 4⅔ months, which is ample for the maturing of all crops grown in this region. The date of the latest killing frost recorded in the spring is June 7 and of the earliest in the fall September 14.

The water supply of the county is obtained mainly from deep wells. Water is ordinarily reached at depths ranging from 30 to 100 feet.

The following table gives the normal monthly, seasonal, and annual temperature and precipitation as recorded at the Weather Bureau station at Hedges, Paulding County:

Normal monthly, seasonal, and annual temperature and precipitation at Hedges.

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.
	°F.	°F.	°F.	*Inches.*	*Inches.*	*Inches.*
December	28.5	67	−14	2.71	2.23	5.55
January	26.5	70	−21	2.44	2.56	5.54
February	22.8	64	−20	2.07	3.41	Trace.
Winter	25.9			7.22	8.20	11.09
March	38.4	82	− 4	3.08	1.53	4.91
April	48.9	91	16	2.76	1.56	2.46
May	6.00	98	24	3.32	2.84	4.88
Spring	49.1			9.16	5.93	12.25
June	68.4	101	35	3.18	0.62	4.75
July	73.3	105	41	3.49	1.61	5.37
August	70.8	103	39	2.74	0.92	2.08
Summer	70.8			9.41	3.15	12.20
September	65.7	100	24	2.27	4.06	3.07
October	52.5	90	7	2.23	2.98	2.22
November	39.4	75	5	2.47	1.91	1.93
Fall	52.5			6.97	8.95	7.22
Year	49.6	105	−21	32.76	26.23	42.76

AGRICULTURE.

At the time the first settlements were made in this region the Indians maintained a reserve near Charloe, where they cleared small patches of upland and bottom soil for growing corn. The early agricultural development of the county was necessarily slow, as the country was heavily forested with oak, hickory, elm, ash, maple, walnut, beech, and sycamore, and the clearing of the land was extremely difficult. The lumbering industry was of great importance from 1865 to about 1880. For several years prior to the Civil War lumber was milled for shipbuilding, and later for the stave, railroad-tie, and hoop-pole trade. The value of the land at this time was based on its forest growth, and its value for agriculture was not considered high, owing to its poorly drained condition. Lands with a virgin growth of timber sold for $6 to $10 an acre.

The first settlers cleared the bottom lands along the Auglaize and Maumee Rivers, and later the higher areas of the uplands, as the larger part of the lower soils was too poorly drained for farming. During rainy seasons water remained on the surface for long periods. Corn was the principal crop at first. Wheat and oats were grown to some extent and the wild grasses were utilized for hay. There were no ready markets, and most of the grain was consumed at home. It was not until a large part of the forest growth was removed that the land was made valuable for farming.

The question of drainage was the greatest problem confronting the early farmer. To-day practically all of the farm lands are drained by means of open ditches and tiles. As more than three-fourths of the land of the county is Clyde clay, which is a very heavy soil with an impervious subsoil, and of slight slope, it has been necessary to establish good drainage systems at considerable expense. The main open ditches usually parallel the roads, though there are some natural drainage courses which do not. The ditches vary in size according to the amount of water to be carried. The main drainage ditches are dug by contract and are paid for by taxation. The cost of the ditches and tiles on each farm is paid by the individual farmer. The tile used for the mains varies from 6 to 8 or 10 inches, while that used for laterals varies from 3 to 6 inches. Practically all of the tile is laid by the use of a ditch dredge or tile dredging machine. The tile is laid at depths ranging from 18 to 36 inches, with a fall of one-fifth to one-tenth foot for every 75 to 100 feet. The laterals are placed from 50 to 75 feet apart, and in some cases 100 feet. Those placed the shorter distance apart seem to give the best results. The soils of the county most in need of tile drainage are the Clyde clay and the Miami clay and clay loam, though almost all of the types are materially improved by tiling. Without drainage little of the land in the county can be farmed successfully. Where properly drained the land has a higher value, selling in some cases for as much as $125 to $200 an acre. Tile can be purchased at most of the towns, where it is manufactured from the Clyde clay subsoil material. In general after drainage the soil warms up earlier in the spring, the moisture is more evenly distributed at all times, there is greater certainty of crops and an improvement in yield and quality.

The soils of Paulding County have a marked uniformity, and in practically all parts of the county they are devoted to the same type of general farming. The soils as a whole are clayey, though there are some sandy ridges and hillocks. Owing to the heavy nature of a large part of the soil, thorough cultivation requires a heavy farm equipment.

The most important crops grown in Paulding County, in order of acreage, are corn, oats, tame or cultivated grasses, wheat, sugar

beets, potatoes, vegetables, rye, and barley. Some of the minor crops are buckwheat, beans, peas, strawberries, blackberries, and alfalfa.

The 1880 census reports 11,255 acres in corn. In 1890, 23,299 acres are reported in this crop, and in 1900, 75,756 acres. The 1910 census reports a total of 69,054 acres in corn, with a yield of 2,779,346 bushels.

The land is generally plowed for corn during the fall months, though in some cases it is plowed in the early spring. The fall months are usually fair, while in the spring there is considerable rain, which delays plowing. The ground is broken to a depth of 6 or 7 inches. Deeper plowing and subsoiling in the fall months are highly beneficial on the heavier clay soils, allowing the alternate freezing and thawing to make the soil looser and lighter in texture. The corn is usually checked, although often it is drilled. It is planted in April and May, or even as late as June. The ground is worked over with disk and harrow into a good seed bed, and subsequent cultivations, which are usually shallow, are made with one and two row cultivators. The crop is cultivated three to five times. No commercial fertilizers are used with corn. Attention is being given to the selection of seed corn, resulting in better quality. The Clyde clay is the best corn soil of the county, and is said to be as productive of corn as the black soils of Iowa and Illinois. The yields range from 25 to 75 bushels per acre, reaching in some cases 100 bushels or more. A small part of the corn is cut for ensilage.

Oats rank next to corn in importance. The acreage has increased steadily from 3,734 reported in the 1880 census to 63,295 acres with a yield of 2,342,187 bushels reported in 1910. The acreage of oats is almost equal to that of corn at the present time. Oats yield 30 to 50 bushels per acre. A common crop rotation consists of corn, oats, and clover. Clover is frequently sown in the oats or in wheat.

The Miami and Clyde soils are well adapted to the grasses. Timothy and clover are extensively grown. Red, mammoth, and alsike are the most popular varieties of clover. Some alfalfa is grown, principally on the Clyde clay.

The area devoted to wheat has steadily decreased since 1880, when it was reported as 11,768 acres. A total of 8,645 acres is reported in wheat in 1909, with a production of 131,313 bushels. The yields during recent years have been declining. In years of excessive rainfall, with frequent freezing and thawing during the winter months, the heaving and breaking of the root systems of the wheat frequently results in crop losses. Wheat yields 20 to 35 bushels per acre as a rule, and in exceptional cases has yielded 45 bushels. It is often grown with corn, oats, and clover in a four-year rotation.

The soils and climate of Paulding County are favorable for the production of sugar beets. The Clyde clay or "black land" is

the soil best suited to the crop, and they are grown only on this type. The sugar-beet industry was started in 1910, when a beet-sugar factory was established at Paulding. The best results with this crop follow deep plowing in the fall, with thorough cultivation in the spring, by means of the disk and roller. The crop is generally planted between May 15 and the last of June, in rows about 18 inches apart, at a depth of 1 to 1½ inches. Shallow planting seems to give the best results. About 15 pounds to the acre is used for seeding at a cost to the farmer of 15 cents a pound, with seed furnished free if reseeding is necessary. The blocking and topping is usually done by contract labor from the factory, and involves a cost of $18 to $25 per acre. The yields range from 8 to 14 tons per acre, for which the farmer receives a flat rate of $5.50 per ton where he delivers the beets at the factory, and $5 per ton where they are shipped, in which case the factory pays the freight charges. The plant at Paulding has a capacity of 900 tons per day, and is in operation 3 to 4 months each year. The 1910 census reports 1,257 acres in sugar beets, with a production of 10,561 tons. The acreage has increased within recent years, reaching a total of about 2,600 acres in 1914. Small quantities of commercial fertilizer are used by some farmers in growing beets.

This general region is not especially adapted to fruit growing, although nearly every farmer has a small orchard in which fruit is produced for home use. There are no commercial orchards in the county. In most of the orchards the trees are too close together, and very little attention is given to pruning and spraying. Where properly sprayed the trees produce good yields of a fair grade of fruit. The fruits commonly grown are apples, peaches, pears, cherries, and grapes, with some plums. Small fruits are grown only for home use.

Very little truck farming is practiced, largely because there are no ready markets, and the soil as a whole is not suited to truck crops.

Stock raising is not of much importance in Paulding County. Dairying has never been carried on extensively. Some milk and cream is shipped to Bryan. The dairy and beef cattle are as a rule of good breeds and are well cared for. Jersey, Shorthorn, and Hereford are the principal breeds, although there are a few of the Holstein, Angus, and Red Polled breeds. The hog-raising industry has declined during recent years, because of the ravages of hog cholera. This industry should prove profitable with the eradication of cholera, as corn for feed is plentiful. The horses raised in the county are principally Percherons and Belgians, and are used for work stock. A few mules also are raised for draft work.

The importance of systematic crop rotation is generally recognized. Crops are grown in rotation on all the upland soil types, especially

on the Clyde clay. The common practice is the three-year rotation of corn, oats, and clover. A two and four year rotation is followed in some cases, the first consisting of corn and oats, and the latter of corn, wheat, oats, and clover. The common practice is to plow clover sod land for corn. The corn is cut and placed in shocks in the fall, and the land is then sown to wheat in the four-year rotation. The strips on which the corn shocks stand are often sown to oats in the spring. Clover is sown broadcast in the wheat in the spring. Hay is cropped for one or two years, and then corn is planted, although the common practice is to keep the land in grass one year. Where the corn fields are not sown to wheat in the fall, oats are seeded in the spring. Two crops of clover are generally cut each season, the first for hay, and the second for seed. In some instances the clover is plowed under in the fall to improve the soil. The turning under of soy beans and cowpeas gives good results.

Some farmers apply manure to the sod and plow it under in the fall. This is an excellent practice, although very few farmers use the farm manure in this way. Commercial fertilizers are used only to a small extent, and seldom except in growing sugar beets. Experiments conducted on the county experiment farm indicate that complete fertilizers produce the best results, although there is some doubt as to the benefit of any fertilizer.

While the soils as a whole are not in need of lime, it is probable that light applications of this material would prove beneficial, although liming experiments on the Clyde clay at the county experiment farm have shown no good results. The Miami soils are acid in the surface section, but seem to contain an adequate supply of lime in the subsoil. They would probably be improved by an application of lime. The Clyde clay is a practically neutral soil. It does not show acidity in either the soil or subsoil.

There has been a steady increase in the area of improved land in this county since 1880. In the 1880 census 1,650 farms were reported in Paulding County. The average size of the farms is given as 80 acres, with a little less than one-half of the farm land, or about 36 acres to each farm, improved. In 1910 a total of 2,840 farms is reported, of an average size of 90 acres, nearly 97 per cent of the total area of the county being in farms. Of this farm land 86.3 per cent, nearly 78 acres per farm, is reported as improved. Land is not held in large tracts as a rule, though some holdings comprise several hundred acres. The farms generally range in size from 75 to 160 acres. The value of all farm property in 1880 is reported as about $2,000 per farm. In the 1910 census it is given as $9,918.

Since 1880 there has been a gradual decrease in the number of farms operated by their owners. The 1880 census reports 82.2 per cent of the farms operated by the owners, while the 1910 census

reports 65.1 per cent so farmed. Where the farms are rented, the share system is general, the rental varying from one-third to one-half of the crops. When the tenant furnishes all work stock, seed, tools, etc., the owner receives one-third of the crops, but if the owner furnishes seed, tools, etc., he receives one-half. Cash rents vary from $3 to $10 an acre, depending upon the soil and improvements.

Improved farm machinery is in common use. Farm labor is obtainable at almost any time at reasonable wages. Laborers are paid $20 to $30 per month, with board. During the harvesting and haying season day laborers are paid $1.50 to $2. Most of the farmers have buildings for the housing of farm machinery.

SOILS.

Paulding County lies within the glaciated region of the United States. It was invaded several times by the ice sheets of Pleistocene time. These left over the entire county a mantle of glacial till varying in thickness, but deep enough over all parts of the county to cover the underlying rocks to a depth of several feet. The underlying consolidated rocks consist of limestone, and the glacial till is highly calcareous and presumably largely of limestone derivation. It is of gray to bluish color and rather heavy texture, and contains relatively few rock fragments. The original surface left by the ice was smooth.

After the disappearance of the ice sheets the region was covered with standing water, forming a large lake. The lake did not stand at the same level throughout its period of existence, At one stage it covered almost the entire area included in Paulding County.

On the bottom of the lake was deposited a layer of silt and clay, usually more than 3 feet in thickness, tending to make the topography smoother than before, filling up the depressions with a thicker coat and covering the low undulations with a correspondingly thinner one. The color of the unweathered part of this layer is bluish. The material is highly calcareous, and the weathered surface layer is thin. Except where cut through by the streams in the formation of their valleys, this is the surface material of the greater part of the county, and the underlying glacial till is exposed only in valleys when it has been uncovered by water action and in a few spots where it projects, as mounds, through the lake-laid material. The latter material is stone-free. Along the shore line of the former lake there is a belt of sands and gravels deposited as the lake beach. They form a low ridge, barely perceptible to the eye even in so flat a country, and are calcareous, especially at depths of 1 or 2 feet.

These till and lake deposits, together with the alluvial deposits along the streams, constitute the parent material of the soils of the county.

The soils in their present condition do not represent an advanced stage in the changes from parent material to soil. The lake-laid material has been weathered to a slight extent, and has accumulated a moderate amount of organic matter in the upper 8 inches, but not enough to make it black; at most it is no darker than a dark gray. The material to a depth of a few inches has suffered some leaching, and is less calcareous than the subsoil. The ice-laid material, because of its topography, has been leached more than the lake-laid material. The soils derived from it are gray to very light brown, though the subsoil shows much less leaching. The surface soil has accumulated very little organic matter. The beach material has weathered to a brown color in the soil and a yellowish brown in the subsoil. It contains larger quantities of organic matter than the ice-laid material. The alluvial soils of the river and creek flood plains are weathered to about the same stage as the beach soils, the surface soils being brown and the subsoils yellowish brown.

This county, therefore, comprises dark-gray soil from lake-laid material, brown soil from lake-beach material, gray soil from ice-laid material, and brown soil from stream-laid material.

The first is classed with the Clyde series, the second with the Belmore series, the third with the Miami series, and the last with the Genesee series. Eight distinct soil types, belonging to these four series, are recognized in Paulding County. The various soils are described in detail in following paragraphs.

The following table gives the name and the actual and relative extent of each soil type mapped:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Clyde clay	205,888	77.9	Miami fine sandy loam	1,216	0.5
Miami clay loam	40,832	15.4	Genesee fine sandy loam	704	.2
Genesee clay loam	10,496	4.0	Belmore loam	128	.1
Miami clay	2,944	1.1			
Belmore fine sandy loam	2,112	.8	Total	264,320	

Clyde Series.

The soils of the Clyde series are characterized by dark-brown to black surface soils and gray, drab, or mottled gray and yellowish subsoils. They are derived through deposition, or the reworking of materials carried on under glacial lakes or ponds, the dark color of the surface soils being due to the high percentage of organic matter caused by the decay of plants under swamp conditions. The soils of the Clyde series grade into Muck and Peat on the one hand and into such glacial-lake soils as the Dunkirk series on the other, without

very sharp boundary lines. They are distinguished from the Poygan soils by the gray instead of reddish subsoils, and from the Fargo in the general absence of calcium carbonate. The topography is level and the soils are naturally poorly drained. This series is represented in Paulding County by a single member, the Clyde clay.

CLYDE CLAY.

The surface soil of the Clyde clay to a depth of 6 to 8 inches is a dark brownish gray to dark-grayish, smooth-textured clay loam to clay. When wet the surface is darker colored, and there are occasional spots in which the soil contains relatively large quantities of vegetable matter and is nearly black in color. When dry the surface soil has a brownish-gray cast. Some rusty-brown spots or concretions are often present in the surface soil.

The subsoil to a depth of 36 inches or more is a gray to drab, mottled with yellow to yellowish-brown, tough, plastic, impervious clay. The subsoil often has a bluish cast, and the mottlings of yellow increase with depth. Small ferruginous concretions and stains are common in the subsoil. Occasionally there are a few rounded pebbles on the surface, and more often in the subsoil, though as a whole the type is free from coarse material. Small, glistening mica particles occur throughout the soil and subsoil, being most noticeable in the former.

Some fine sand is present near the ridges of Belmore fine sandy loam in the northeastern corner of the county, the sand having been washed from the hillocks over the Clyde clay. Such areas include a clay loam soil, but are too small to be shown separately on a map of the scale used. In a small area one-half mile southeast of Payne the surface is a clay loam, and till material is present in both the soil and subsoil. This area does not include more than 3 to 6 acres, and is mapped with the Clyde clay on account of its small size. A similar area occurs one-half mile northeast of Dill School, in Benton Township. This area, likewise, is not mapped separately. About one-half mile south of Batson there is an area in which the surface soil is a clay loam, but here, too, the difference in the soil material is not of sufficient importance to warrant the establishing of a separate type.

The greatest variation in the Clyde clay occurs along North Creek, east of Antwerp. In the lower places and along the stream the soil varies from a dark-brown to dark-colored silt to silty loam, having a rather fibrous structure approaching a muck surface soil, while the subsoil is a gray to drab, mottled with yellow to brown, heavy, plastic clay, very similar to the typical Clyde clay. This particular description is not at all the rule, for in many places the surface soil is a dark-brown clay similar to the Clyde clay elsewhere. This vari-

ation has only a small development along North Creek, and is not indicated on the map on account of its small extent and because some of it is representative of the Clyde clay. The variation constitutes a mucky clay phase of the Clyde clay. From an agricultural standpoint it differs very little from the main type. The fibrous-structured or muck material is the result of the decay of vegetable débris under water. This region was formerly an old reservoir and the water stood here for several years while the Wabash & Erie Canal was in operation.

The Clyde clay is by far the most extensive soil type in the county, covering 77.9 per cent of its area. It covers practically all of the glacial-lake depressions, known as the Maumee Lake Bottom. It is locally known as "black land." As a whole, the soil is quite uniform in texture and color, and the same type of general farming is carried on over the entire type.

In seasons of light rainfall the soil cracks to a depth of 15 to 20 inches or more where not cultivated to corn, beets, or some other tilled crop. It becomes very dry and hard and difficult to handle. In cultivated fields moisture is reached within 2 to 4 inches of the surface. When in the proper tilth this soil has a loose, granular structure and is easily tilled. When wet it has a tendency to compact and bake, thus forming a crust on the surface. On the whole, the soil is well supplied with organic matter, and, where well drained, after cultivation for a time it becomes pulverulent, resembling a clay loam in texture. The type is very retentive of moisture when cultivated, but when not tilled it cracks and rapidly loses its moisture.

Owing to the flat surface of this soil type, the heavy texture of soil and subsoil, and its low position, artificial drainage is necessary. All the type under cultivation is drained by means of large ditches along the roads, with laterals draining into them from the adjacent fields.

Practically all of the Clyde clay is cultivated to corn, oats, clover and timothy, sugar beets, rye, peas, and beans, named in order of acreage. This type is recognized as the best corn soil in the county. Yields in favorable seasons generally range from 50 to 75 bushels per acre. Wheat is not grown extensively, on account of injury from heaving of the soil in the winter. Wheat yields vary from 25 to 45 bushels per acre. The type is well suited to grass, and yields of timothy and clover range from $1\frac{1}{2}$ to $2\frac{1}{2}$ tons per acre. Sugar beets are grown on this type and yield 8 to 14 tons per acre. A small acreage is devoted to alfalfa, which gives fair yields.

Rotation is practiced with all crops on the Clyde clay, the common rotation being corn, oats, and clover or timothy. Wheat and beets are often used in a four-year rotation. The Clyde clay shows little or no acidity in either the surface soil or subsoil, as revealed by

litmus-paper tests. When tested for lime with hydrochloric acid, to a depth of 42 inches, it occasionally shows effervescence. Near the outer beach in Benton Township in the southwestern corner of the county the calcareous material approaches the surface, ranging from 25 to 30 inches below. Over the larger part of this township the lacustrine material is not so deep as farther to the north. Calcareous material seldom occurs within 36 to 42 inches of the surface a few miles away from this old beach. Where the lower subsoil has been thrown out of the deep drainage ditches along the roadsides it supports a rank growth of sweet clover, and when planted to corn, oats, or other crops, these small strips seem to produce a much ranker growth than the land farther back from the ditches. This would seem to indicate that an application of lime would prove beneficial, although in experiments at the county experiment farm the use of lime so far has not resulted in any improvement.

There are some light spots in the Clyde clay in which the plowing under of green manuring crops is highly beneficial.

The Clyde clay is considered the strongest and best soil type of the county, and commands the highest price. The high price of this land is due in part to the good condition of the houses, barns, granaries, fences, and tile drains on the farms. Well-tilled lands with good improvements sell for $125 to $200 an acre, and in some cases as high as $250.

Miami Series.

The soils of the Miami series are brown, light brown, or grayish, and are underlain by yellowish and brown, heavier textured subsoils. Mottlings of brown and light gray are present in the subsoil in many places, particularly in the case of the clay loam member. The surface drainage is usually good, but artificial drainage is necessary on some of the heavier types. The soils are mainly derived through weathering from glacial till of a generally calcareous nature. Some of the gravelly phases, however, are, in part at least, water assorted, having been deposited as obscurely stratified material in the form of kames. In Paulding County this series comprises three types—the Miami fine sandy loam, clay loam, and clay.

MIAMI FINE SANDY LOAM.

The surface soil of the Miami fine sandy loam, extending to a depth of 8 to 12 inches, is a gray to brownish-gray fine sandy loam. When dry the surface soil is gray to almost white. The subsoil is a mottled yellow, brown, and gray, rather heavy, plastic clay, containing a few iron stains. The upper part of the subsoil often contains some fine sand, and is relatively friable.

The topography of this type is level to gently sloping. Its main occurrence is near Charloe, along the Auglaize River near the mouth of Blue Creek. There are other small areas in the county, but as a whole the type is not very extensive. It occurs principally along the stream courses, but also as isolated ridges or slight elevations in areas of the Clyde clay. At Briceton it occupies a slightly elevated ridge, with a very gently rolling topography: The soil here is similar to that along the Auglaize River in color and texture, but there is more gravel and till material present in the subsoil, and it is more crumbly and friable as a whole. The type has good natural drainage. It is subject to wash along the stream courses, and if not properly handled, deep gullies and ditches rapidly develop.

Originally all of this type was heavily forested with oak, hickory, beech, elm, and other trees, but at present practically all of it is cleared and under cultivation. The Miami fine sandy loam is considered a good general farming soil. It is rather deficient in organic matter. The application of barnyard manure and the plowing under of green manuring crops supply this constituent and increase the productiveness of the type. The soil is loose and easily tilled, and warms up early in the spring. It does not require so much attention in handling as the heavier clay and clay loam types. The surface soil is not very retentive of moisture on account of its porous structure. Crops do better in seasons of moderate rainfall.

A large part of the type is farmed to corn, oats, wheat, and hay. This soil is not quite so productive as the Clyde clay and Miami clay loam. Corn produces 25 to 40 bushels per acre, oats 25 to 40 bushels, wheat 18 to 30 bushels, and hay 1 to 2 tons. Peaches, apples, and cherries are grown successfully.

This type is somewhat less productive than some of the other upland soils and is sold for $75 to $125 an acre, its value depending on the improvements and its location with respect to markets.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Miami fine sandy loam:

Mechanical analyses of Miami fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
271501	Soil	0.4	2.8	6.4	52.5	11.3	17.6	9.0
271502	Subsoil	.0	1.2	3.2	24.0	6.1	25.7	39.6

MIAMI CLAY LOAM.

The soil of the Miami clay loam to a depth of 5 to 8 inches consists of a gray to grayish-brown, heavy silt loam or silty clay loam to clay

loam. The color of the surface material varies with its moisture content. When dry it is quite grayish, and when wet it is brownish or darker colored. In small depressions, where foreign materials have been washed in, the color is much darker than on the elevations. The subsoil to a depth of more than 36 inches is a brown to yellowish-brown, mottled with gray to yellow, silty clay loam, and generally an impervious clay below 20 inches. Occasionally the lower part of the section contains some sandy material. The mottlings of gray are very pronounced in the greater part of the type. Below 24 to 30 inches the subsoil is usually calcareous. Iron concretions and stains are present in the subsoil. There is usually a sufficient amount of fine angular gravel and sand in the lower subsoil to impart a gritty feel. The larger part of the till material occurs at 3 to 8 feet below the surface, as observed in road cuts and stream banks, and is underlain by a slightly bluish bowlder clay.

There are some variations in the surface soil of this type. In some local spots the soil is a silt loam to a depth of 8 inches, but as a whole the type varies from a silty clay loam to clay loam. The subsoil varies in the amount of till material present. Glacial bowlders and rock fragments, consisting of granite, quartz, quartzite, and greenstone, are often present on the surface and throughout the soil, but not in sufficient quantities to interfere with cultivation.

The Miami clay loam is the second most extensive soil type in the county. It occurs mainly on the slopes near the stream courses, although there are many small level areas scattered through the Clyde clay, and slightly elevated above it. As a whole, however, the Miami clay loam lies 3 to 8 feet or more lower than the Clyde clay.

The Miami clay loam has a nearly level to gently undulating and irregular topography and there is enough relief to give good surface drainage, although in all areas of the type tiling is beneficial. In the more broken tracts, where the surface drainage is excessive, considerable washing and gullying has taken place. The farmers consider the Miami clay loam harder to drain than the Clyde clay. Much of the type is tile drained. It is locally known as "clay land" or "gray land."

Originally all of this type was forested with a growth of oak, hickory, elm, maple, ash, beech, and sycamore. A very small part of the type is forested at present, although most farms have a small woodlot for pasture shade and for wood.

The Miami clay loam is considered a good general farming soil. As a rule it is rather low in organic matter, as is indicated by its surface color. The plowing under of manure and green manuring crops, such as peas and beans, adds vegetable matter to the soil. Where cultivated at the proper stage, it is not a difficult soil to handle, as it works up into a mellow tilth. If plowed while too wet or too dry, it

breaks into hard clods, which are difficult to pulverize. The methods of plowing and handling this soil are similar to those employed on the Clyde clay. It is slightly acid in the surface, as shown by litmus tests, although at depths of 20 to 30 inches lime is abundant. The lime in the surface soil has probably been removed by the action of leaching waters. An application of burnt lime or crushed limestone would probably prove very beneficial to this type. The principal crops are oats, wheat, hay, and corn. The type is not considered as good for corn as the Clyde clay, but for oats, wheat, and hay it compares favorably with that soil. A crop rotation of oats, wheat, hay, and corn is generally practiced on this soil, the grass being allowed to remain for two years or more. With proper care, corn yields 35 to 45 bushels per acre, wheat 15 to 30 bushels, oats 30 to 50 bushels, and hay 1½ to 2½ tons. This type makes excellent hay and pasture land. Canadian and Kentucky bluegrass and white clover do well. Some sorghum, millet, and garden truck are grown on this type. Apples, peaches, cherries, and small fruits do very well.

Farm land of this type is not valued as highly as the Clyde clay. Fenced and well-improved lands are held at $75 to $125 an acre.

MIAMI CLAY.

The surface soil of the Miami clay extends to a depth of 4 to 6 inches, and consists of a light brownish gray to gray heavy clay loam to clay. There are some small spots in which the soil is more nearly a silt loam. The subsoil is a dull-brown to yellowish-brown, mottled with gray, impervious clay. While gray is one of the most prominent colors in the subsoil, the mottlings are not so pronounced as in the subsoil of the Miami clay loam, brown being the prevailing color. Iron concretions and stains are common, and the type carries much coarse material, consisting of gravel and glacial till. The till material, which is largely calcareous, occurs at 2 to 3 feet below the surface. Some glacial bowlders and rock fragments are scattered over the surface and through the subsoil.

The Miami clay represents an eroded phase of the Miami clay loam type, the surface material having been removed through the agency of erosion. About 3 miles east of Antwerp, in the old reservoir, there are some small areas of Miami clay which were originally high points or islands in the reservoir. The action of the waves removed the surface soil down to the heavy clay. Also in the areas along the Maumee River and elsewhere the surface soil has been removed, giving rise to the clay type. The Miami clay is locally known as "clay land." As a whole the soil is quite uniform in texture and color.

This type is encountered mainly along the Maumee River. It is not an extensive soil. Its topography varies from level to quite

irregular and broken as the river is approached. In a few places the type is broken by deep draws and gullies.

Owing to its generally rolling to sloping topography, this soil has good surface drainage, though the underground drainage is poor because of the heavy, impervious nature of the subsoil. Tile drainage is generally necessary. Farmers consider this type even harder to drain than the Miami clay loam.

The Miami clay is naturally difficult to handle, and a large part of it is not used for cultivated crops. In seasons of light rainfall it cracks, like the Clyde clay, when not cultivated. If plowed when too wet or too dry it forms large irregular clods which can be broken only with difficulty, so that it is necessary to plow this soil under the most favorable moisture conditions. It gives best results in seasons of moderate rainfall.

This type is slightly acid in the surface section and could be improved by an application of lime. The subsoil is highly calcareous. The type is deficient in organic matter, and the application of barnyard manure and the turning under of green manuring crops are effective methods of supplying this material and also of improving the soil texture. Fall plowing is beneficial, as the freezing and thawing during the winter make the soil more granular.

In view of the crop yields, the Miami clay is not considered a very valuable soil. It is largely farmed to oats, wheat, and hay. Some corn is grown, producing from 20 to 35 bushels per acre. Oats yield 30 to 40 bushels per acre, wheat produces 15 to 30 bushels, and hay 1 to 2 tons per acre. A large part of the type is forested with a rather scrubby growth of oak, hickory, elm, and other trees. The type is used mainly for hay and pasture. It is a good grass soil.

The Miami clay has a lower value than the Clyde clay or Miami clay loam, and is held at $75 to $100 an acre, depending on the improvements.

Results of mechanical analyses of samples of the soil and subsoil of this type are given below:

Mechanical analyses of Miami clay.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
271513	Soil	0.0	0.4	0.5	1.8	1.0	34.0	62.2
271514	Subsoil	.2	1.0	1.0	3.2	1.1	56.5	37.0

Belmore Series.

The surface soils of the Belmore series are grayish brown to slightly reddish brown, with yellowish-brown to slightly reddish brown subsoils, usually overlying a substratum of calcareous sand and gravel.

The Belmore soils represent old beach lines and occur as long, narrow ridges, seldom more than 100 yards in width or 15 feet in height. In mapping these ridges it is generally necessary to exaggerate their width, but the marked difference in the character of the soil of these beaches and their topographic prominence render this justifiable. There is a wide variation in the texture of these soils, but they consist mainly of sandy loam or loam, containing variable quantities of gravel. The loam and fine sandy loam types are recognized.

BELMORE FINE SANDY LOAM.

The surface soil of the Belmore fine sandy loam has a depth of 12 to 15 inches. It consists of a brown or chocolate-brown to grayish-brown loamy fine sand to fine sandy loam. When dry the surface has a grayish cast. The subsoil to a depth of 40 inches is a lighter brown to yellowish-brown fine sandy loam, which is slightly grayish in the lower part. A few iron stains are present in the subsoil.

There are some variations in the lower subsoil of this type. Southeast of Paulding the soil is underlain by gravel and pebbles which are largely calcareous. This gravel layer is seldom encountered within less than 42 inches of the surface. The calcareous material is 10 to 15 feet deep, as observed in dredging for gravel, and rests upon a clay. In some spots the sandy material does not extend to more than 24 to 30 inches and rests upon a gray and drab clay. In such areas this type does not occupy pronounced hillocks or ridges, being not more than 2 to 2½ feet above the surrounding soils.

This soil is rather inextensive, occurring as isolated ridges or hillocks on the old lake bottom lying 2 to 8 feet higher than the surrounding country. The type occurs mainly in the northeastern part of the county, in Brown, Auglaize, and Emerald Townships, though some small areas are encountered in other sections. It is probable that this is an inner beach or a later beach than the one in the southwestern corner of the county, and that the sandy material was deposited on slightly elevated areas, or at the outer edge of the lake when it stood at that level. Owing to its gently rolling topography and porous structure, this is naturally a well-drained soil.

This type is easily tilled. The best crop yields are secured during seasons of moderate rainfall, as the soil is not very retentive of moisture and in times of drought it becomes very dry. It is cultivated to all the general farm crops common to the region. Corn yields 35 to 50 bushels per acre, oats 25 to 35 bushels, and wheat 20 to 30 bushels. This is a good clover and alfalfa soil, and the acreage of alfalfa could be profitably increased. It is also well suited to fruit. Truck crops of all kinds and small fruit do well.

The Belmore fine sandy loam is a highly prized soil, having about the same value as the Clyde clay.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Belmore fine sandy loam:

Mechanical analyses of Belmore fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
271503	Soil	0.3	3.3	8.2	61.7	7.7	9.8	8.9
271504	Subsoil	.0	3.6	8.4	64.7	12.2	6.2	4.9

BELMORE LOAM.

The soil of the Belmore loam to a depth of 10 to 15 inches is a loam, brown or reddish brown to grayish brown when dry. It contains varying quantities of small gravel from one-eighth to one-half inch in diameter. The subsoil to a depth of more than 36 inches is a lighter brown to yellowish-brown loam, containing considerable quartzite, shale, and limestone gravel and some coarse sand. The texture of the subsoil varies. In places the lower part is practically all gravel or coarse sand, with enough clay to hold it together. In some small spots the surface soil contains considerable sand. Immediately underlying the subsoil, beds of gravelly clay varying from 2 to 4 feet in thickness are encountered and under this are beds of purer gravel, which extend to considerable depths. These gravels and sands are used for building roads and walks and in concrete work. The larger part of this material is calcareous.

The Belmore loam has a very small total area in Paulding County, being encountered only in the extreme southwestern corner, in sec. 31, Benton Township. It occupies a low, rounded ridge, with gentle slopes. This ridge is about one-fourth mile wide and a mile long in this county, but extends westward into Indiana, and eastward into Van Wert County. It represents the old or outer south beach of Lake Maumee, formed when the water stood at that level for a considerable length of time. In this county the ridge is only 6 to 10 feet higher than the surrounding soils. This type consists of reworked glacial till, mainly of a calcareous nature.

Owing to its gently rolling topography and its loose, open structure, the type is well drained. It is an easy soil to cultivate, and warms up early in the spring. As a whole, this soil is not very retentive of moisture, and crops do best in seasons of moderate rainfall.

The general farm crops of this region are grown on this soil type, corn, oats, wheat, and grasses being the most important. Corn yields 45 to 60 bushels per acre, oats 40 to 60 bushels, wheat 25 to 35 bushels, and hay 1 to 2 tons.

This ridge affords excellent building sites and is largely used in this way. Fruits and vegetables are grown extensively, though not

in a large commercial way on this type. It is well suited to orchards, and peaches, apples, and cherries of good quality are produced. Potatoes, tomatoes, and other truck crops do well.

No farms are located wholly on this type, and the land is sold in connection with associated soils. It is valued at $150 to $200 an acre.

Results of mechanical analyses of samples of the soil and subsoil of this type follow:

Mechanical analyses of Belmore loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
271505	Soil	7.2	8.5	4.0	10.4	9.0	42.3	18.4
271506	Subsoil	5.7	11.0	5.5	13.0	9.2	32.0	23.3

Genesee Series.

The Genesee series includes soils formed from dark-brown to grayish-brown alluvial sediments deposited along the major streams and their tributaries throughout the northeastern glaciated region, particularly where the Dunkirk, Volusia, Miami, and Ontario series constitute the principal upland soils. The soils of this series also occur for a short distance south of the glaciated area, where the main streams have their headwaters in areas covered by these soil series. The sandy members of the series are prevailingly light brown to gray and the loam and silt loam members darker brown. The soils of this series are subject to either annual or frequent overflow. Two members of the Genesee series, the fine sandy loam and the clay loam, are recognized in Paulding County.

GENESEE FINE SANDY LOAM.

The soil of the Genesee fine sandy loam to a depth of 10 to 15 inches is a brown or grayish-brown to yellowish loamy fine sand to fine sandy loam. On drying out the surface has a rather grayish to grayish-brown cast. The subsoil to a depth of about 42 inches is a lighter brown to yellowish-brown fine sandy loam. In the lower part it frequently grades into a gray or yellow fine sand. The soil is loose, friable, and easily cultivated.

The Genesee fine sandy loam has a very small extent in Paulding County and is encountered only along the Maumee River. It is not continuous along the Maumee River, but is found principally in the inner bends or ox-bows of this stream, adjoining the stream channel. The larger part of the type occurs on slight natural levees, sloping away from the stream. As a whole, this type is slightly elevated

above the associated Genesee clay loam. Owing to the structure of this soil and its slight slope it is well drained. It is fairly well supplied with organic matter.

Practically all of this type is cultivated to corn, oats, wheat, timothy, and clover, with some alfalfa. Corn is the principal crop grown on the type, and in favorable seasons produces 40 to 75 and occasionally as much as 100 bushels per acre. Oats do well, yielding 25 to 50 bushels per acre. Wheat also does well and is not injured by the heaving of the soil as much as on the heavier Clyde clay. This is an excellent alfalfa soil, where not subject to deep overflow. It is well suited to truck crops, and potatoes, melons, tomatoes, etc., are grown for home use. Trucking on a commercial scale is not practiced, owing to the lack of ready markets.

This is a highly prized soil and it is held at $125 to $200 an acre.

GENESEE CLAY LOAM.

The surface soil of the Genesee clay loam has a depth of 8 to 10 inches. It varies from a brown to dark-brown heavy silty clay loam to clay loam. In the larger areas the soil has a darker color than in the narrower strips, for in the latter the lighter colored soils of the Miami series have been washed down by rain waters and mixed with the alluvial material. This is most noticeable near the adjoining upland slopes. A few iron stains are present in the surface soil. The soil is mellow and more easily worked than the heavy upland soils. The subsoil to a depth of about 42 inches is a lighter brown to chocolate-colored clay loam to clay. It becomes heavier and more compact with depth. The change from soil to subsoil is very gradual. The lower subsoil has a yellower color, yet in places brown predominates. A few mottlings of gray and some iron stains are present in the subsoil.

The Genesee clay loam is rather uniform along the Auglaize and Maumee Rivers, but along the smaller streams and creeks there is some variation in color and texture. Along Flatrock Creek and other creeks of similar size the color and texture are most variable. Included with this type are a few small depressions, about 1 to 2 rods wide, comprising black, heavy, plastic clay, which is underlain by a black, grading into drab, plastic clay. Such areas represent former stream beds and are poorly drained. These spots are too small to be shown separately on the soil map, and are included with this type. A few small areas in which the surface soil is a gray to yellowish silt loam, underlain by a brown to yellowish-brown, mottled with gray, clay are also included with the type. Such areas seldom exceed 2 to 4 acres. The subsoil resembles the Miami subsoil. While these variations are most common along Flatrock Creek, along the smaller streams or draws the soil is darker colored and heavier

than usual, and the subsoil is a gray to drab, mottled with yellow and brown, clay. Such variations are the result of material washed from the Clyde clay or deposited by the draws along their courses.

The type has a nearly level topography and fair natural drainage. It is occasionally overflowed. The most extensive development of this soil is along the Maumee and Auglaize Rivers and along Flatrock Creek. The bottom lands along the Auglaize River are rather narrow, while along the Maumee River and the creeks they vary from one-eighth to one-half mile in width.

The Genesee clay loam is easily cultivated when moisture conditions are favorable. When dry it bakes and cracks and is very difficult to plow, and when too wet it breaks up into large irregular clods. In the early spring a large part of the type is subject to overflow and difficulty is experienced in breaking and planting. Most of the plowing on this soil is done in the spring after the danger from inundation has passed. Where plowed in the fall, much of the soil material is removed by the overflows.

Originally this type was heavily forested with ash, elm, sycamore, hickory, and water oak. At present practically all of it is cleared and farmed. It is used for all the general farm crops. Corn is the principal crop grown, yielding 40 to 60 bushels per acre in favorable seasons. Oats produce 30 to 45 bushels per acre. Wheat yields 20 to 35 bushels and hay 1½ to 2 tons per acre. No commercial fertilizer is used, but barnyard manure is applied with good results.

No farms are located wholly upon this type, and it is held in connection with the upland soils.

In the following table are given the results of mechanical analyses of samples of the soil and subsoil of the Genesee clay loam:

Mechanical analyses of Genesee clay loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
271507	Soil	0.3	0.2	1.2	14.7	17.0	40.6	26.0
271508	Subsoil	.2	.2	.9	17.2	19.2	36.4	25.9

SUMMARY.

Paulding County is located in the northwestern part of Ohio and has an area of 413 square miles, or 264,320 acres. The surface varies from level to slightly rolling. The larger part of the county comprises an old lake bottom and is nearly flat, with some slight ridges and knolls. The average elevation of the county is about 745 feet. In general, it has a slight slope to the northeast, and is drained to the northeast through the Maumee and Auglaize River systems.

Paulding County was first settled in 1819. Settlement was most rapid during the latter part of the nineteenth century. The county is now thickly settled and well developed, and lies within one of the richest agricultural sections of the State. The roads are largely improved, and are in good condition the greater part of the year. The railroads of the county furnish adequate transportation for a highly developed section.

The climate of the county is healthful and well suited to general farming. Extreme temperatures seldom occur, and do not last for any great length of time. The yearly rainfall ranges from about 26 to 43 inches, with a mean of about 33 inches. The heaviest precipitation occurs during the spring and summer months. The mean annual temperature is about 50° F. There is an average growing season of about 141 days.

The agriculture of Paulding County is in a prosperous condition. Corn, oats, clover, timothy, wheat, potatoes, and sugar beets are the principal products, practically all of the soil types giving good yields. The Clyde clay is the recognized corn and oat soil of the county. The Miami clay loam is well adapted to oats, wheat, and hay, and grasses for pasturage. Very little attention is given to dairying, and stock raising is practiced only in a small way.

The importance of crop rotation is generally recognized. A three-year rotation of corn, oats, and clover is usually practiced. Very little manure is used, although in most cases the soils are in need of such material. A little commercial fertilizer is used, mainly on the sugar-beet lands. Farm laborers are paid $20 to $30 per month.

Practically all of the land in the county is improved. The average size of farms is 90 acres, and about 65 per cent of the farms are operated by the owners. The value of farm land varies with the soil and also with the improvements and location with respect to markets, the Clyde clay commanding the highest price. In general land values range from $75 to $200 an acre, although some of the Clyde clay is held for $250.

Eight soil types are recognized in Paulding County. The soils are of glacial and lacustrine origin and range from sand to clay in texture. The lacustrine soils are composed of dark-colored material which occupies an old lake bottom and was deposited by the waters of the lake. It remained in a swampy, poorly drained condition for a long time and has given rise to the Clyde clay. The lighter colored soils are included in the Miami and Belmore series. The alluvial soils are classed with the Genesee series.

The Clyde clay covers more than three-fourths of the county. It is a good general-purpose soil and is highly productive where tile drained. The surface is mainly flat.

The Miami clay loam is the second most extensive soil type in the county and is well developed along the stream slopes. It is a good general-farming soil. The surface features are level to rolling.

The Miami clay has a small total area in this county. It is best suited to oats, wheat, and grasses, and is largely used for grass land. The Miami fine sandy loam occurs in level to gently sloping areas, principally on slightly elevated ridges along the stream courses. It is a fair corn, oats, wheat, and hay soil, but is deficient in organic matter.

The Belmore fine sandy loam is an inextensive type, occurring on isolated hills and ridges, principally in the northeastern part of the county. It is a good general-purpose soil and is well adapted to truck and fruit. This soil is rather well supplied with organic matter.

The Belmore loam occurs only in the extreme southwestern corner of the county as a narrow ridge. It is a good soil for general farming. It is largely used as building sites and for orchards and gardens.

The Genesee clay loam and fine sandy loam are alluvial soils. They are subject to overflow, but in favorable seasons produce good yields of corn, oats, and hay. They are good, strong soils, fairly well supplied with organic matter.

In general the darker colored soils of the county are fairly well supplied with organic matter, while the lighter colored soils are in need of humus. The Miami soils are apparently deficient in lime.

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SOIL MAP
OHIO
PAULDING COUNTY SHEET

U S DEPT OF AGRICULTURE
BUREAU OF SOILS
MILTON WHITNEY, CHIEF
CURTIS F MARBUT, IN CHARGE SOIL SURVEY

OHIO AGRICULTURAL EXPERIMENT STATION
CHARLES E THORNE, DIRECTOR
GEORGE N COFFEY, IN CHARGE SOIL SURVEY

SOIL PROFILE
(3 feet deep)

Clyde clay — Cl to C, Hc

Miami clay loam — Sil to Sicl, Sicl, C

Miami clay — Cl to C, Hc

Miami fine sandy loam — Fsl, C

Belmore loam — L, Grl

Belmore fine sandy loam — Fsl, Fsl

Genesee fine sandy loam — Fsl, Fsl

Genesee clay loam — Cl to Sicl, Cl to C

LEGEND

Cl	Clay loam
C	Clay
Hc	Heavy clay
Sil	Silt loam
Sicl	Silty clay loam
Fsl	Fine sandy loam
L	Loam
Grl	Gravelly loam

LEGEND

Clyde clay — Cc	Belmore loam — Bl
Miami clay loam — Ml	Belmore fine sandy loam — Bf
Miami clay — Mc	Genesee fine sandy loam — Gf
Miami fine sandy loam — Mf	Genesee clay loam — Gc

CONVENTIONAL SIGNS

CULTURE
(printed in black)

City or Village, Roads, Buildings, Wharves, Jetties, Breakwater, Levee, Lighthouse, Port.

Secondary roads and Trails

Railroads Steam and Electric

Bridges, Ferry

R. R. crossings, Tunnel

Ford, Dam

School or Church Cemeteries

Mine or Quarry Mine dumps Made land

Bluff, Escarpment. Rock outcrop and Triangulation station

Stony and Gravelly areas

Soil boundaries Oil wells and tanks

Boundary lines

Boundary lines

Boundary lines

U. S. township and section lines

RELIEF
(printed in brown or black)

Contours Depression contours

Prominent Hills Mountain Peaks

Sand, Wash, and Sand dunes

Shore and Low-water line, Sandbar

DRAINAGE
(printed in blue)

Streams

Lakes, Ponds, Intermittent lakes

Intermittent streams

Springs, Canals and Ditches, Flumes

Fresh marsh Salt marshes

Submerged marsh Tidal flats

The above signs are in current use on the soil maps. Variations from this usage appear in some maps of earlier date.

W.E.McLendon, Inspector Northern Division
Soils surveyed by H.G. Lewis of the U.S. Department of Agriculture, and Carl W. Shiffler of the Ohio Agricultural Experiment Station.

BASE MAP FROM U.S. GEOLOGICAL SURVEY SHEETS

Scale 1/62500
1 0 1 2 3 4 Miles
1 0 1 2 3 4 5 Kilometers

Contour interval 10 feet.
Datum is mean sea level.

SNYDER & BLACK, N.Y.

Field Operations Bureau of Soils 1914

[PUBLIC RESOLUTION—No. 9.]

JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, providing "for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided*, That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture.

Approved, March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils.]

Areas surveyed in Ohio.

Date Due

JAN 20 1966			
FEB 24			
SEP 2	1975		
APR	8 1977		